Interim Progress Report
NOAA's Human Dimensions of Global Change Research (HDGCR) Program

Project Title: Sustainable Adaptations to Drought and Climate Variability in Agricultural Production Systems Across Nebraska

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I. Preliminary Materials

A. Project Abstract:

Drought is a normal part of Nebraska's climate. It is also the leading cause of monetary disaster loss in the United States. FEMA (1995) has estimated that U.S. drought losses average $6-8 billion dollars per year. A majority of these losses are incurred in the agricultural sector. Nebraska's losses alone topped $1.2 billion in 2002 (AP 2003).

To enhance viable operations in this variable climate, many Nebraska farmers and ranchers have begun making the transition to agricultural practices that fall into the realm of sustainable agriculture. Sustainability has been increasingly stressed as essential for creating more resilient systems and reducing the effects of natural hazards (Anderson 1994, Mileti et al. 1995, Mehta 1997, United Nations 1997, Mileti 1999). However, little research has been done to understand the linkages between sustainable agriculture and drought management. This type of research is essential for enhancing agricultural adaptations to climate variability in Nebraska and in similar regions around the world.

Therefore, this study will focus on investigating the linkages between sustainable agriculture and drought within the State of Nebraska. Specifically, this research will investigate coping mechanisms adopted by sustainable producers to reduce the effects of short and long-term drought, their perceived feasibility and effectiveness, and producer perceptions of drought and forecast products that are needed to increase the resiliency of sustainable agricultural systems to drought. This information will be collected through a mail-back survey and in-depth interviews of Nebraska's sustainable agriculture producers whom have had recent experience dealing with one of the most severe droughts in Nebraska's recorded history.

This producer-based information will be useful to drought and agricultural planners and decision makers, and will help them identify specific mitigation actions that any producer might take to reduce their risk of future drought impacts resulting from normal climate variability or potential climate change. It is also expected that this study will have wide applicability to other areas of the Great Plains and similar regions around the world.

B. Objective of Research Project

This study will focus on investigating the linkages between sustainable agriculture and drought within the State of Nebraska. Specifically, this research will investigate coping mechanisms adopted by sustainable producers to reduce the effects of short and long-term drought, their perceived feasibility and effectiveness, and producer perceptions of drought and forecast products that are needed to increase the resiliency of sustainable agricultural systems to drought. This information will be collected through surveys of Nebraska's sustainable agriculture producers.

C. Project Approach

The first step is to organize a review panel of sustainable agricultural producers. This panel will assist in developing survey instruments and in reviewing the research throughout its completion. The panel of approximately 10 producers will be recruited with assistance from the Nebraska Center for Rural Affairs (CFRA), whose staff has been working with agricultural producers within Nebraska since 1972. This panel will represent different traits in local farming communities, including sizes of farmland, financial status, and education level.

The next step is to seek assistance from the review panel in creating the mail-back survey that will be sent to the survey population. To initiate this collaboration, the panel will be invited to participate in a focus group where the study will be presented to the participants. In addition, the panel will be presented with the proposed survey instrument. The panel will be asked to provide feedback on the questionnaire and develop additional questions relevant to the research. The outcome of the focus group will be a survey questionnaire and a relevant evaluation protocol.

After the questionnaire and evaluation method are developed with the focus group, we will conduct a mail-back survey of the members of the Nebraska Sustainable Agricultural Society, the Nebraska Crop Improvement Association, and holistic resource management producers within the state. Addresses for these producers will be obtained from voluntary membership directories and personal contacts in the case of the holistic resource management group.

The mail-back survey will utilize Dillman's Total Design Method (Dillman 1978), which includes an introductory letter to inform the target producers of the survey and its importance followed by the survey and a personalized cover letter a week later. Non-respondents will receive a reminder postcard after one week and another copy of the survey after three weeks. Survey data will be geo-referenced. Geo-referencing will allow for a spatial analysis of the survey information in relation to available baseline data. For example, this process will allow for a comparison of production factors based on drought severity through use of the United States Drought Monitor product (http://drought.unl.edu/dm/). First developed in 1999, the U.S. Drought Monitor is a weekly series of drought coverage maps that represents a consensus of federal, state, and academic scientists. It is the new USDA standard in documenting drought conditions in the United States. Factors such as sustainable crop yields will also be compared to average county crop yield data from the National Agriculture Statistics Service to investigate the benefit of sustainable agricultural practices. In addition, perceptions of climate information will be compared to related geo-referenced research findings from Knutson et al. (2001) and current work in Nebraska by Hu et al. (2002).

Upon completion of the mail-back survey analysis, the review panel will again be assembled to review the results and help develop another set of questions to be administered in face-to-face interviews. Willing members of the surveyed producers will again be interviewed in face-to-face qualitative interviews to evaluate study findings and fill in additional details to provide a deeper understanding of the sustainable drought management issues. Together, an analysis of survey and interview results will yield valuable information to assist drought and agricultural planners and decision makers in incorporating drought issues in sustainable farm and ranch management.

II. Interactions

Project members only interactions thus far in the study were with farm and ranch operators through a focus group and mail survey. These activities are described in the project accomplishments.

III. Accomplishments

A. Tasks Accomplished

A mail-back survey instrument was initially designed by the research team. After receiving UNL Institutional Review Board approval, the team then conducted a focus group with sustainable farmers and ranchers in Walthill, Nebraska, to finalize development of the mail-back survey instrument. The survey was then mailed to 633 sustainable farmers and ranchers across Nebraska. Out of this number, 122 responses were received for a response rate of over 19 percent. Along with the survey, we asked producers to return an enclosed postcard if they would be willing to participate in a face-to-face interview. Fifty-seven respondents agree to such an interview. The mail-back surveys are currently being analyzed and the face-to-face interviews are tentatively scheduled to begin in June 2005.

B. Preliminary Findings

Although the mail-back surveys are still being analyzed, there are a few preliminary findings to report. The age of respondents ranged from 26 to 88 with an average age of 55 years. Nearly 12 percent of the respondents were female. Approximately 80 percent of survey respondents had some college education and nearly 55 percent had at least a bachelor's degree. Years of farming experience ranged from one to sixty-one with an average of nearly 32 years. The majority of respondents own their farm/ranch, but more than 27 percent of respondents lease some land every year. Thirty-four respondents (33 percent) reported raising organic crops or livestock. The majority of the respondents completing the survey were ranchers (47 percent), followed by farmer/rancher combination (38 percent), and farmer (15 percent). The reported size of farms and ranches ranged from 3.5 to 100,000 acres, with an average of 5,694 acres. Farmers reported an average farm size of 1226 acres while ranchers reported 8375 acres (nearly 7 times more land).

More than 62 percent of respondents stated that the recent droughts have caused them to modify their cropping system, while 38 percent said that they had not. For example, 47 percent reported changing tillage systems or the number of farming passes. Fifty percent of producers said that drought had also caused them to change livestock types or numbers (35 percent said no, and 15 percent did not answer). Forty-five percent of the respondents said that the recent drought has affected their long-term management goals. The large majority of producers (87 percent) felt that they were less susceptible to the effects of drought than more conventional producers. Eighty-nine percent of producers said that short- and long-term practices helped reduce the effects of drought. The producers went on to describe these practices. On a scale of 1-5, producers were also asked to describe barriers in implementing more strategies to reduce drought impacts (1= small barrier and 5= large barrier). Respondents felt that most common issues were relatively small to moderate barriers although some were ranked more highly than others, such as a lack of capital to modify operations and the necessity of maximizing profits.

If in November-January, weather forecasts were to predict a drought during the next growing season, 40 percent of respondents stated that their choices about what to produce, how to produce it, or how much to produce would be different. Looking ahead five years into the future, 37 percent of respondents stated that they were still not likely to use long-term weather forecasts in decision-making. Fifty-three percent were moderately likely to use the forecasts, while 10 percent were very likely to use the forecasts. When broken down, ranchers were more optimistic about the potential use of climate forecasts in the future. Overall, producers are most

likely to use current/recent past information for cropping and livestock decisions rather than short- or long-term forecasts primarily because of forecast accuracy issues.

C. Significant Deviations from Proposed Work Plan

Thus far, there have only been two deviations from the work plan. First, the project was delayed several months when gaining final project approval by the UNL Institutional Review Board, which monitors all projects involving human subjects. In 2004, the University of Nebraska modified their IRB procedures and began to require that all project personnel undertake IRB training (instead of only principle investigators). Conforming to these changes delayed project approval. The only other deviation is that we increased our survey sample size (from 300 to 633) because memberships to sustainable agricultural groups in Nebraska had been underestimated. This has benefited the project.

IV. Relevance to the Field of Human-Environmental Relations

A. Impacts/Contributions of Project Results

As stated before, project information is still being analyzed. However, Nebraska farmers and ranchers are commenting on their use and non-use of climate information in decision-making during the last several years of drought, barriers to using climate information, and their perceptions of the potential use of climate information in the future. In addition, they are commenting on new adaptations that have been implemented in order to better withstand the effects of drought and general climate variability. These issues are very important in several areas of study including: adaptations to long-term climate change, natural hazards mitigation, the development of climatic tools for end users, and the use of local knowledge in developing new scientific information. As we continue analyzing survey results and incorporate additional ethnographic interview data, this study will provide detailed information useful to a wide range of agricultural producers and planners interested in reducing the effects of recurring drought, climate variability, and potential climate change.